IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	PATENT APPLICATION
Stephen P. DeOrnellas, et al.	Examiner: Alejandro Mulero, Luz L.
Application No.: 09/888,365	Art Unit: 1792
Filed: June 22, 2001	Confirmation No.: 8894
For: IMPROVED REACTOR WITH HEATED AND TEXTURED ELECTRODES AND SURFACES	

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APPEAL BRIEF

This is an appeal to the Board of Patent Appeals and Interferences from the decision of the Examiner dated November 29, 2007 which finally rejected claims 19, 67-75, and 84-85 in the above-identified application.

A PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. §1.136 for extending the time to respond up to and including today, May 27, 2008, together with the appropriate fee, is also submitted herewith.

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the full interest in the invention, Tegal Corporation, 2201 S. McDowell Blvd., Petaluma, California, 94954.

II. RELATED APPLEALS AND INTERFERENCES

To the best of Appellants' knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.

III. STATUS OF THE CLAIMS

Claims 19, 67-75, and 84-86 are pending in the application and were finally rejected in an Office Action mailed November 29, 2007. Claims 1-18, 20-66, 76-83, and 86 were canceled. Claims 19, 67-75, and 84-85 are the subject of this appeal. A copy of claims 19, 67-75, and 84-85 as they stand on appeal are set forth in the Claims Appendix.

IV. STATUS OF AMENDMENTS

No amendments have been submitted subsequent to the Final Office Action mailed November 29, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 19 recites a method of operating a reactor which comprises a reactor chamber (paragraph [0024], line 1), an upper electrode (element 20 of Figs. 1 and 2; paragraph [0024], line 4), a heater that heats said upper electrode (element 24 of Figs. 1 and 2; paragraph [0024], line 7), and gas inlets and outlets (original claim 12, line 3), the method comprising: introducing process gas into said reactor chamber (original claim 12, line 4), wherein the method of

operation of the reactor is a platinum etch method (paragraph [0027], line 10; [0031], line 3), and wherein oxygen and chlorine are present in the reactor (paragraph [0027], line 13); wherein platinum and one or both of the oxygen and the chlorine are deposited on the upper electrode (paragraph [0027], lines 10-13); heating the upper electrode with said heater to a temperature in order to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the electrode (paragraph [0027], line 14; original claim 19, lines 3-5), such that a layer of material is formed on the upper electrode (paragraph [0027], line 15); wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode (paragraph [0008], lines 1-5; [0027], lines 15-20).

Claim 69 recites a method of platinum etch (paragraph [0027], line 10; [0031], line 3) in a reactor which comprises a reactor chamber (paragraph [0024], line 1), an upper electrode (element 20 of Figs. 1 and 2; paragraph [0024], line 4), a heater that heats said upper electrode (element 24 of Figs. 1 and 2; paragraph [0024], line 7), and gas inlets and outlets (original claim 12, line 3), the method comprising: introducing process gas into said reactor chamber (original claim 12, line 4); and heating the upper electrode with said heater to a temperature in order to cause halogen elements (paragraph [0029], lines 3-5) to de-absorb from the upper electrode such that deposits of mostly platinum forms a layer of material (paragraph [0027], line 15); wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of mostly platinum on the surface of the upper electrode (paragraph [0008], lines 1-5; [0027], lines 15-20).

Claim 84 recites a method of operating a reactor which comprises a reactor chamber (paragraph [0024], line 1), an upper electrode (element 20 of Figs. 1 and 2; paragraph [0024], line 4), a heater that heats said upper electrode (element 24 of Figs. 1 and 2; paragraph [0024], line 7), and gas inlets and outlets (original claim 12, line 3), the method comprising: introducing

process gas into said reactor chamber (original claim 12, line 4), the process gas including one or both of oxygen and chlorine (paragraph [0027], line 13); performing a platinum etch process in said reactor chamber; and heating the upper electrode with said heater to a temperature capable of decomposing one or both of platinum chloride and platinum dioxide (paragraph [0027], lines 12-13; paragraph [0029], line 5) so that a layer of material formed on the upper electrode during the platinum etch process comprises mostly platinum (paragraph [0027], line 14; original claim 19, lines 3-5); and wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to decompose the one or both of platinum chloride and platinum dioxide (paragraph [0008], lines 1-5; [0027], lines 9-20).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 19, 67-75, and 84-85 are unpatentable under 35 U.S.C. § 103(a) over Collins et al. ("Collins", U.S. Patent 5,556,501) in view of DeOrnellas et al. ("DeOrnellas", WO 99/25568).

B. Whether claims 19, 67-75, and 84-85 are unpatentable under 35 U.S.C. § 103(a) over Collins in view of Keizo (JP 07-130712A).

C. Whether claims 19, 67, 69-70, 72-75, and 84 are unpatentable under 35 U.S.C. § 103(a) over Imai et al. ("Imai", WO 97/27622) in view of DeOrnellas.

D. Whether claims 68, 71 and 85 are unpatentable under 35 U.S.C. § 103(a) over Imai in view of DeOrnellas as applied to claims 19, 67, 69-70, 72-75, and 84 above, and further in view of Collins.

E. Whether claims 19, 67, 69-70, 72-75, and 84 are unpatentable under 35 U.S.C. § 103(a) over Imai in view of Keizo.

F. Whether claims 68, 71 and 85 are unpatentable under 35 U.S.C. § 103(a) over Imai in view of Keizo as applied to claims 19, 67, 69-70, 72-75, and 84 above, and further in view of Collins.

VII. ARGUMENT

A. Claims 19, 67-75, and 84-85 are patentable under 35 U.S.C. § 103(a) over Collins et al. ("Collins", U.S. Patent 5,556,501) in view of DeOrnellas et al. ("DeOrnellas", WO 99/25568).

Claims 19, 69, and 84 stand or fall together, and claim 19 is a representative claim. Claim 19 recites:

19. A method of operating a reactor which comprises a reactor chamber, an upper electrode, a heater that heats said upper electrode, and gas inlets and outlets, the method comprising:

introducing process gas into said reactor chamber, wherein the method of operation of the reactor is a platinum etch method, and wherein oxygen and chlorine are present in the reactor;

wherein platinum and one or both of the oxygen and the chlorine are deposited on the upper electrode;

heating the upper electrode with said heater to a temperature in order to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the electrode, such that a layer of material is formed on the upper electrode;

wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode, which reduces the disadvantages resulting from spaulding, flaking or delaminating of the deposits in semiconductor processing. Claim 19 discloses heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode. Claim 69 discloses heating the upper electrode to cause halogen elements to de-absorb from the upper electrode. Claim 84 discloses heating the upper electrode to cause decomposing one or both of platinum chloride and platinum dioxide.

Applicant submits that the present claim is patentable over Collins in view of DeOrnellas since both Collins and DeOrnellas all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode.

Collins discloses a plasma reactor having a heater to heat the chamber walls and chamber top dome. The top dome plate can include a top electrode (Col. 21, lines 49-50). Collins discloses an embodiment where a heat exchanger can control the wall and dome temperature from heating to cooling, for example, +120C to -150C (Col. 21, lines 17-20). However, Collins is silent with respect to heating the upper electrode to a temperature to form a more stable layer. The Examiner also agreed that Collins fails to expressly disclose heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the surface (Office Action, p. 3).

DeOrnellas discloses a method to minimizing the critical dimension growth during a platinum etch process by allowing the temperature of the wafer to climb to the range of about 130C to about 300C (page 3, lines 7-9). DeOrnellas discloses that at low temperature, more material is deposited back onto the wafer than at high temperature, resulting in loss of critical dimension:

> *The growth in the critical dimension is attributable to the deposit of etched materials and/or compounds of etch materials and process gases on the sidewalls*

of the feature being etched and the photoresist. Assuming the above process is used for etching a layer of platinum on a semiconductor wafer, the etching causes the platinum and/or a platinum chloride composition to stick to the sidewall surfaces of the feature and the photoresist. If the feature is cold, there is a greater tendency for the materials to stick to the sidewall. Heating the surface by controlling the heat transfer from the wafer such as for example by controlling the gas pressure behind the wafer results in less material sticking to the sidewalls. At lower temperatures, the material sticking to the sidewalls is generally platinum, dichloride ($PtCl_2$) or platinum trichloride ($PtCl_3$). As the temperature increases, the deposits at the sidewall include a thinner layer of platinum, with fewer chlorine compounds being deposited. (page 8, line 25 to page 9, line 9)

DeOrnellas is silent with respect to a heated upper electrode, and thus applicant submits that DeOrnellas fails to disclose heating the upper electrode to a temperature to form a more stable layer.

Further, applicant submits that the present claim is not obvious to persons skilled in the art in view of a combination of Collins and DeOrnellas, since there is no motivation or suggestion to use the heater of Collins in the platinum etch process of DeOrnellas to heat the upper electrode to form a stable film. The lack of motivation to heat the upper electrode can be attributed to at least the following reasons:

1. There is no indication from either Collins or DeOrnellas that there are deposits of platinum and one or both of the oxygen and chlorine on the upper electrode. Collins is silent with respect to a platinum etch, and thus fails to indicate deposits of platinum or oxygen or chlorine on the upper electrode. Applicant also submits that Collins is silent with respect to any material depositing on the upper electrode. Collins discloses that the upper electrode release free silicon to react with fluorine (Col. 22, lines 2-9). Thus applicant further submits that Collins teaches away from the present invention depositing on the upper electrode.

DeOrnellas discloses an etch process of a platinum wafer using chlorine gas. DeOrnellas further discloses that platinum and platinum chloride composition can stick back to features on the wafer. Thus applicant submits that DeOrnellas discloses that platinum deposits can form on

the platinum wafer during the etch process (page 8, line 28 to page 9, line 1). Applicant submits that DeOrnellas is silent with respect to platinum deposits forming on the upper electrode.

2. There is no indication from either Collins or DeOrnellas that heating the upper electrode would form a more stable film on the surface of the electrode. Collins is silent with respect to a platinum etch, to platinum etch by-products, and also fails to indicate heating the upper electrode would form a more stable film. Collins discloses that heating the upper electrode would increase the reactivity of the electrode (Claim 1, element g, last 3 lines), resulting in increasing the dissociation of silicon within the electrode and releasing more free silicon from the electrode. Thus applicant submits that Collins teaches away from the present invention heating to form a more stable film on the upper electrode.

DeOrnellas discloses a method to minimizing the critical dimension growth during a platinum etch process. DeOrnellas discloses a relationship between the wafer temperature and the deposition thickness of platinum and platinum by-products on the wafer surface (Fig. 2; Col. 9, lines 1-2). DeOrnellas also discloses that the deposit composition might be different at different temperature. Low temperature deposits are generally platinum and platinum chlorides. High temperature deposits include platinum with fewer chloride compounds (Col. 9, lines 5-9). DeOrnellas is mainly concern with reducing the platinum deposits on the wafer since their thickness affects the critical dimension control, and thus degrades the etch performance.

However, DeOrnellas provides no suggestion or motivation of heating to a temperature to form more stable film as disclosed by the present claim, which directs to the stability of the platinum deposits on the upper electrode. The thickness of the deposits is not a main concern, since there are no features or critical dimensions on the upper electrode. Thus applicant submits that it is not obvious to person skilled in the art to infer from DeOrnellas's disclosure that high temperature deposits are more stable. Platinum chloride compounds are solid at up to 400C (for example, $PtCl_2$ melts at 581C, and $PtCl_4$, 370C), and thus applicant submits that there is no

suggestion of increasing film stability at the temperature range of 130-300C as disclosed by DeOrnellas.

3. Collins equipment is not adequate to experiment with DeOrnellas process. Applicant submits that the present invention cannot be accidental discovered by using DeOrnellas process on Collins equipment, since Collins equipment is only capable of heating up to 120C, while DeOrnellas temperature range is from 130C to 300C. With the lack of capability, applicant submits that routine experimentation on Collins equipment with DeOrnellas process cannot discover the present invention.

In the Office Action, the Examiner stated that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Collins et al. so as to perform the platinum etch process of DeOrnellas et al. because this would be a suitable method, for example, to <u>reduce</u> the platinum deposits that can form on the <u>wafer</u>" (underlined added by applicant).

Applicant submits that the present claim directs to the stability of the platinum deposits on the upper electrode, which can cause flaking or delamination and degrade etching performance. The deposits or the deposits' thickness on the wafer are not a concern, thus applicant submits that even that it is obvious to combine Collins with DeOrnellas to <u>reduce</u> the platinum deposits that can form on the <u>wafer</u>, it still would not be obvious to form a more <u>stable</u> film on the upper <u>electrode</u>.

In the Office Action, the Examiner further stated that "note that the process of Collins et al. modified by DeOrnellas et al. includes a process where platinum and one or both of oxygen and chlorine are deposited on the upper electrode, and the layer of material formed on the upper electrode is <u>more stable</u> than a layer of material form when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode" (underlined added by applicant).

Applicant submits that this statement is strictly highsight, generated as a result of the present invention. Collins and DeOrnellas are all silent with respect to heating the upper electrode to form a more stable film. Further, as discussed above, there is no motivation or suggestions from both Collins and DeOrnellas to form a stable film on the upper electrode surface by heating the electrode.

In the Response to Argument, the Examiner stated that other natural advantages generated from heating the upper electrode, which are followed from suggestions of prior art, cannot be the basis for patentability. Applicant submits that the present invention directs to heating an upper electrode to form more stable film from the deposits on the electrode. In contrast, Collins discloses heating an electrode to increase the reactivity of the electrode, meaning making the electrode easier for dissociation. DeOrnellas discloses heating a wafer to reduce deposits on the wafer's features. Thus applicant submits that the prior arts of Collins and DeOrnellas do not suggest heating the upper electrode to form more stable film from the deposits on the electrode.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

Claims 67, 70, and 85 stand or fall together, and claim 67 is a representative claim. Claim 67 recites:

67. The method of claim 19, wherein the step of heating using the heater that heats the upper electrode comprises heating to a temperature between about 300°C to about 500°C.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer, which reduces the disadvantages resulting from spaulding, flaking or delaminating in semiconductor processing. The present claim provides a limitation of the temperature between about 300C to about 500C. Applicant submits

that in certain embodiments, this temperature provides the transition to a more stable film of the deposits on the electrode surface.

Applicant submits that the present claim is patentable over Collins in view of DeOrnellas since both Collins and DeOrnellas all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature between about 300C to about 500C to form a more stable layer.

Collins discloses a heater capable of heating an electrode to 120C, and DeOrnellas discloses heating a wafer from 130C to 300C. Thus both references fail to disclose heating the upper electrode to between about 300C to about 500C.

Further, applicant submits that it is not obvious to one of ordinary skill in the art to modify the temperature range of Collins or DeOrnellas, mainly due to lack of motivation. Collins discloses heating an electrode for increase reactivity, and thus there is no advantage to heat the electrode to above 120C. DeOrnellas discloses heating the wafer to control the critical dimension growth, 130C-300C being the optimum range. In fact, Fig. 2 of DeOrnellas indicates that there is significant damage to critical dimension control at temperature above 300C. Thus applicant submits that DeOrnellas teaches away from heating the wafer to above 300C.

Further, the present claim directs to stabilize the deposits on the upper electrode, and for that, a temperature range between 300 and 500C is desirable in certain embodiments. Applicant submits that both Collins and DeOrnellas fail to suggest any motivation to heat the upper electrode to this temperature range.

The Examiner stated that this temperature range is simply the result of optimum range by routine experimentations. Applicant respectfully disagrees. There is no motivation or suggestion from Collins or DeOrnellas to heat the electrode to this temperature range. For example, since the upper electrode is near the chamber wall, high temperature would cause safety concern. Thus it is not routine experimentation to heat the upper electrode to a temperature above 300C.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

B. <u>Claims 19, 67-75, and 84-85 are patentable under 35 U.S.C. § 103(a) over Collins in view of Keizo (JP 07-130712A).</u>

Claims 19, 69, and 84 stand or fall together, and claim 19 is a representative claim. Claim 19 recites:

19. A method of operating a reactor which comprises a reactor chamber, an upper electrode, a heater that heats said upper electrode, and gas inlets and outlets, the method comprising:

introducing process gas into said reactor chamber, wherein the method of operation of the reactor is a platinum etch method, and wherein oxygen and chlorine are present in the reactor;

wherein platinum and one or both of the oxygen and the chlorine are deposited on the upper electrode;

heating the upper electrode with said heater to a temperature in order to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the electrode, such that a layer of material is formed on the upper electrode;

wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode, which reduces the disadvantages resulting from spaulding, flaking or delaminating of

the deposits in semiconductor processing. Claim 19 discloses heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode. Claim 69 discloses heating the upper electrode to cause halogen elements to de-absorb from the upper electrode. Claim 84 discloses heating the upper electrode to cause decomposing one or both of platinum chloride and platinum dioxide.

Applicant submits that the present claim is patentable over Collins in view of Keizo since both Collins and Keizo all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode.

Collins discloses a plasma reactor having a heater to heat the chamber walls and chamber top dome. The top dome plate can include a top electrode (Col. 21, lines 49-50). Collins discloses an embodiment where a heat exchanger can control the wall and dome temperature from heating to cooling, for example, +120C to -150C (Col. 21, lines 17-20). However, Collins is silent with respect to heating the upper electrode to a temperature to form a more stable layer. The Examiner also agreed that Collins fails to expressly disclose heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the surface (Office Action, p. 5).

Keizo discloses a method to form a vertical side wall during a platinum etch process by heating the wafer to at least 350C (Abstract, lines 1-6). Keizo discloses that at high temperature, there is no contamination reattached on the side wall in a treatment step.

Keizo is silent with respect to a heated upper electrode, and thus applicant submits that Keizo fails to disclose heating the upper electrode to a temperature to form a more stable layer.

Further, applicant submits that the present claim is not obvious to persons skilled in the art in view of a combination of Collins and Keizo, since there is no motivation or suggestion to use the heater of Collins in the platinum etch process of Keizo to heat the upper electrode to

form a stable film. The lack of motivation to heat the upper electrode can be attributed to at least the following reasons:

1. There is no indication from either Collins or Keizo that there are deposits of platinum and one or both of the oxygen and chlorine on the upper electrode. Collins is silent with respect to a platinum etch, and thus fails to indicate deposits of platinum or oxygen or chlorine on the upper electrode. Applicant also submits that Collins is silent with respect to any material depositing on the upper electrode. Collins discloses that the upper electrode release free silicon to react with fluorine (Col. 22, lines 2-9). Thus applicant further submits that Collins teaches away from the present invention depositing on the upper electrode.

Keizo discloses an etch process of a platinum wafer using chlorine gas. Keizo further discloses that contamination can reattached to the side wall features on the wafer. Thus applicant submits that Keizo discloses that deposits can form on the platinum <u>wafer</u> during the etch process. Applicant submits that Keizo is silent with respect to deposits forming on the upper electrode.

2. There is no indication from either Collins or Keizo that heating the upper electrode would form a more stable film on the surface of the electrode. Collins is silent with respect to a platinum etch, to platinum etch by-products, and also fails to indicate heating the upper electrode would form a more stable film. Collins discloses that heating the upper electrode would increase the reactivity of the electrode (Claim 1, element g, last 3 lines), resulting in increasing the dissociation of silicon within the electrode and releasing more free silicon from the electrode. Thus applicant submits that Collins teaches away from the present invention heating to form a more stable film on the upper electrode.

Keizo discloses a method to etch a vertical feature of platinum on a wafer. Keizo discloses a relationship between the wafer temperature and the contamination reattached on the wafer surface. Keizo is mainly concern with the vertical side wall of the feature, as shown in the difference between Fig. 2(b) and 2(c).

However, Keizo provides no suggestion or motivation of heating to a temperature to form more stable film as disclosed by the present claim, which directs to the stability of the platinum deposits on the upper electrode. The vertical side wall is not a main concern, since there are no features on the upper electrode. Thus applicant submits that it is not obvious to person skilled in the art to infer from Keizo's disclosure that high temperature deposits are more stable.

3. Collins equipment is not adequate to experiment with Keizo process. Applicant submits that the present invention cannot be accidental discovered by using Keizo process on Collins equipment, since Collins equipment is only capable of heating up to 120C, while Keizo temperature range is above 350C. With the lack of capability, applicant submits that routine experimentation on Collins equipment with Keizo process cannot discover the present invention.

In the Office Action, the Examiner stated that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Collins et al. so as to perform the platinum etch process of Keizo et al. because this would be a suitable method, for example, to reduce the platinum deposits that can form on the <u>wafer</u>" (underlined added by applicant).

Applicant submits that the present claim directs to the stability of the platinum deposits on the upper electrode, which can cause flaking or delamination and degrade etching performance. The deposits or the deposits' thickness on the wafer are not a concern, thus applicant submits that even that it is obvious to combine Collins with Keizo to reduce the platinum deposits that can form on the <u>wafer</u>, it still would not be obvious to form a more <u>stable</u> film on the upper <u>electrode</u>.

In the Office Action, the Examiner further stated that "note that the process of Collins et al. modified by Keizo includes a process where platinum and one or both of oxygen and chlorine are deposited on the upper electrode, and the layer of material formed on the upper electrode is <u>more stable</u> than a layer of material form when heating the upper electrode with said heater to a

temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode" (underlined added by applicant).

Applicant submits that this statement is strictly highsight, generated as a result of the present invention. Collins and Keizo are all silent with respect to heating the upper electrode to form a more stable film. Further, as discussed above, there is no motivation or suggestions from both Collins and Keizo to form a stable film on the upper electrode surface by heating the electrode.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

Claims 67, 70, and 85 stand or fall together, and claim 67 is a representative claim. Claim 67 recites:

67. The method of claim 19, wherein the step of heating using the heater that heats the upper electrode comprises heating to a temperature between about 300°C to about 500°C.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer, which reduces the disadvantages resulting from spaulding, flaking or delaminating in semiconductor processing. The present claim provides a limitation of the temperature between about 300C to about 500C. Applicant submits that in certain embodiments, this temperature provides the transition to a more stable film of the deposits on the electrode surface.

Applicant submits that the present claim is patentable over Collins in view of Keizo since both Collins and Keizo all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature between about 300C to about 500C to form a more stable layer.

Collins discloses a heater capable of heating an electrode to 120C, and Keizo discloses heating a wafer above 350C. Thus both references fail to disclose heating the upper electrode to between about 300C to about 500C.

Further, applicant submits that it is not obvious to one of ordinary skill in the art to modify the temperature range of Collins or Keizo, mainly due to lack of motivation. Collins discloses heating an electrode for increase reactivity, and thus there is no advantage to heat the electrode to above 120C. Keizo discloses heating the wafer to control the etch profile above 350C.

Further, the present claim directs to stabilize the deposits on the upper electrode, and for that, a temperature range between 300 and 500C is desirable in certain embodiments. Applicant submits that both Collins and Keizo fail to suggest any motivation to heat the upper electrode to this temperature range.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

C. <u>Claims 19, 67, 69-70, 72-75, and 84 are unpatentable under 35 U.S.C. § 103(a) over Imai et al. ("Imai", WO 97/27622) in view of DeOrnellas..</u>

Claims 19, 69, and 84 stand or fall together, and claim 19 is a representative claim. Claim 19 recites:

19. A method of operating a reactor which comprises a reactor chamber, an upper electrode, a heater that heats said upper electrode, and gas inlets and outlets, the method comprising:

    introducing process gas into said reactor chamber, wherein the method of operation of the reactor is a platinum etch method, and wherein oxygen and chlorine are present in the reactor;

wherein platinum and one or both of the oxygen and the chlorine are deposited on the upper electrode;

heating the upper electrode with said heater to a temperature in order to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the electrode, such that a layer of material is formed on the upper electrode;

wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode, which reduces the disadvantages resulting from spaulding, flaking or delaminating of the deposits in semiconductor processing. Claim 19 discloses heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode. Claim 69 discloses heating the upper electrode to cause halogen elements to de-absorb from the upper electrode. Claim 84 discloses heating the upper electrode to cause decomposing one or both of platinum chloride and platinum dioxide.

Applicant submits that the present claim is patentable over Imai in view of DeOrnellas since both Imai and DeOrnellas all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode.

Imai discloses a plasma reactor having a heater to heat an electrode to a constant temperature. However, Imai is silent with respect to heating the upper electrode to a temperature to form a more stable layer. The Examiner also agreed that Imai fails to expressly disclose

heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the surface (Office Action, p. 7).

DeOrnellas discloses a method to minimizing the critical dimension growth during a platinum etch process by allowing the temperature of the wafer to climb to the range of about 130C to about 300C (page 3, lines 7-9). DeOrnellas discloses that at low temperature, more material is deposited back onto the wafer than at high temperature, resulting in loss of critical dimension (page 8, line 25 to page 9, line 9).

DeOrnellas is silent with respect to a heated upper electrode, and thus applicant submits that DeOrnellas fails to disclose heating the upper electrode to a temperature to form a more stable layer.

Further, applicant submits that the present claim is not obvious to persons skilled in the art in view of a combination of Imai and DeOrnellas, since there is no motivation or suggestion to use the heater of Imai in the platinum etch process of DeOrnellas to heat the upper electrode to form a stable film. The lack of motivation to heat the upper electrode can be attributed to at least the following reasons:

1. There is no indication from either Imai or DeOrnellas that there are deposits of platinum and one or both of the oxygen and chlorine on the upper electrode. Imai is silent with respect to a platinum etch, and thus fails to indicate deposits of platinum or oxygen or chlorine on the upper electrode. Applicant also submits that Imai is silent with respect to any material depositing on the upper electrode. Imai discloses that the rough upper electrode release more free silicon to react with fluorine. Thus applicant further submits that Imai teaches away from the present invention depositing on the upper electrode.

DeOrnellas discloses an etch process of a platinum wafer using chlorine gas. DeOrnellas further discloses that platinum and platinum chloride composition can stick back to features on the wafer. Thus applicant submits that DeOrnellas discloses that platinum deposits can form on

the platinum wafer during the etch process (page 8, line 28 to page 9, line 1). Applicant submits that DeOrnellas is silent with respect to platinum deposits forming on the upper electrode.

2. There is no indication from either Imai or DeOrnellas that heating the upper electrode would form a more stable film on the surface of the electrode. Imai is silent with respect to a platinum etch, to platinum etch by-products, and also fails to indicate heating the upper electrode would form a more stable film. Imai is silent with the purpose of heating the upper electrode, and stated simply that a heater is to heat the upper electrode to a constant temperature. Thus applicant submits that Imai fails to teach heating to form a more stable film on the upper electrode.

DeOrnellas discloses a method to minimizing the critical dimension growth during a platinum etch process. DeOrnellas discloses a relationship between the wafer temperature and the deposition thickness of platinum and platinum by-products on the wafer surface (Fig. 2; Col. 9, lines 1-2). DeOrnellas also discloses that the deposit composition might be different at different temperature. Low temperature deposits are generally platinum and platinum chlorides. High temperature deposits include platinum with fewer chloride compounds (Col. 9, lines 5-9). DeOrnellas is mainly concern with reducing the platinum deposits on the wafer since their thickness affects the critical dimension control, and thus degrades the etch performance.

However, DeOrnellas provides no suggestion or motivation of heating to a temperature to form more stable film as disclosed by the present claim, which directs to the stability of the platinum deposits on the upper electrode. The thickness of the deposits is not a main concern, since there are no features or critical dimensions on the upper electrode. Thus applicant submits that it is not obvious to person skilled in the art to infer from DeOrnellas's disclosure that high temperature deposits are more stable. Platinum chloride compounds are solid at up to 400C (for example, $PtCl_2$ melts at 581C, and $PtCl_4$, 370C), and thus applicant submits that there is no suggestion of increasing film stability at the temperature range of 130-300C as disclosed by DeOrnellas.

In the Office Action, the Examiner stated that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Imai et al. so as to perform the platinum etch process of DeOrnellas et al. because this would be a suitable method, for example, to reduce the platinum deposits that can form on the wafer" (underlined added by applicant).

Applicant submits that the present claim directs to the stability of the platinum deposits on the upper electrode, which can cause flaking or delamination and degrade etching performance. The deposits or the deposits' thickness on the wafer are not a concern, thus applicant submits that even that it is obvious to combine Imai with DeOrnellas to reduce the platinum deposits that can form on the wafer, it still would not be obvious to form a more stable film on the upper electrode.

In the Office Action, the Examiner further stated that "note that the process of Imai et al. modified by DeOrnellas et al. includes a process where platinum and one or both of oxygen and chlorine are deposited on the upper electrode, and the layer of material formed on the upper electrode is more stable than a layer of material form when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode" (underlined added by applicant).

Applicant submits that this statement is strictly highsight, generated as a result of the present invention. Imai and DeOrnellas are all silent with respect to heating the upper electrode to form a more stable film. Further, as discussed above, there is no motivation or suggestions from both Imai and DeOrnellas to form a stable film on the upper electrode surface by heating the electrode.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

Claims 67, 70 stand or fall together, and claim 67 is a representative claim. Claim 67 recites:

67. The method of claim 19, wherein the step of heating using the heater that heats the upper electrode comprises heating to a temperature between about 300°C to about 500°C.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer, which reduces the disadvantages resulting from spaulding, flaking or delaminating in semiconductor processing. The present claim provides a limitation of the temperature between about 300C to about 500C. Applicant submits that in certain embodiments, this temperature provides the transition to a more stable film of the deposits on the electrode surface.

Applicant submits that the present claim is patentable over Imai in view of DeOrnellas since both Imai and DeOrnellas all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature between about 300C to about 500C to form a more stable layer.

Imai discloses a heater to heat an electrode to a constant temperature, and DeOrnellas discloses heating a wafer from 130C to 300C. Thus both references fail to disclose heating the upper electrode to between about 300C to about 500C.

Further, applicant submits that it is not obvious to one of ordinary skill in the art to modify the temperature range of Imai or DeOrnellas, mainly due to lack of motivation. Imai is silent with respect to the purpose of heating the upper electrode. DeOrnellas discloses heating the wafer to control the critical dimension growth, 130C-300C being the optimum range. In fact, Fig. 2 of DeOrnellas indicates that there is significant damage to critical dimension control at temperature above 300C. Thus applicant submits that DeOrnellas teaches away from heating the wafer to above 300C.

Further, the present claim directs to stabilize the deposits on the upper electrode, and for that, a temperature range between 300 and 500C is desirable in certain embodiments. Applicant

submits that both Imai and DeOrnellas fail to suggest any motivation to heat the upper electrode to this temperature range.

The Examiner stated that this temperature range is simply the result of optimum range by routine experimentations. Applicant respectfully disagrees. There is no motivation or suggestion from Imai or DeOrnellas to heat the electrode to this temperature range. For example, since the upper electrode is near the chamber wall, high temperature would cause safety concern. Thus it is not routine experimentation to heat the upper electrode to a temperature above 300C.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

D. Claims 68, 71 and 85 are patentable under 35 U.S.C. § 103(a) over Imai in view of DeOrnellas as applied to claims 19, 67, 69-70, 72-75, and 84 above, and further in view of Collins.

Claim 85 stands alone. Claim 85 recites:

85. The method of claim 84, wherein the upper electrode comprises aluminum and the upper electrode is heated to a temperature ranging from 300°C to 350°C.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer, which reduces the disadvantages resulting from spaulding, flaking or delaminating in semiconductor processing. The present claim provides a limitation of the temperature between about 300C to about 350C. Applicant submits that in certain embodiments, this temperature provides the transition to a more stable film of the deposits on the electrode surface.

Applicant submits that the present claim is patentable over Imai, DeOrnellas and Collins since these prior art references all fail to disclose at least an element of the present claim, namely

heating the upper electrode to a temperature between about 300C to about 350C to form a more stable layer.

Collins discloses a heater capable of heating an electrode to 120C, DeOrnellas discloses heating a wafer from 130C to 300C, and Imai discloses heating an upper electrode to a constant temperature. Thus all references fail to disclose heating the upper electrode to between about 300C to about 350C.

Further, applicant submits that it is not obvious to one of ordinary skill in the art to modify the temperature range of Imai, Collins or DeOrnellas, mainly due to lack of motivation. Imai is silent with respect to the purpose of heating the electrode. Collins discloses heating an electrode for increase reactivity, and thus there is no advantage to heat the electrode to above 120C. DeOrnellas discloses heating the wafer to control the critical dimension growth, 130C-300C being the optimum range. In fact, Fig. 2 of DeOrnellas indicates that there is significant damage to critical dimension control at temperature above 300C. Thus applicant submits that DeOrnellas teaches away from heating the wafer to above 300C.

Further, the present claim directs to stabilize the deposits on the upper electrode, and for that, a temperature range between 300 and 350C is desirable in certain embodiments. Applicant submits that the prior art references all fail to suggest any motivation to heat the upper electrode to this temperature range.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

E. <u>Claims 19, 67, 69-70, 72-75, and 84 are unpatentable under 35 U.S.C. § 103(a) over Imai in view of Keizo.</u>

Claims 19, 69, and 84 stand or fall together, and claim 19 is a representative claim. Claim 19 recites:

19. A method of operating a reactor which comprises a reactor chamber, an upper electrode, a heater that heats said upper electrode, and gas inlets and outlets, the method comprising:

introducing process gas into said reactor chamber, wherein the method of operation of the reactor is a platinum etch method, and wherein oxygen and chlorine are present in the reactor;

wherein platinum and one or both of the oxygen and the chlorine are deposited on the upper electrode;

heating the upper electrode with said heater to a temperature in order to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the electrode, such that a layer of material is formed on the upper electrode;

wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode, which reduces the disadvantages resulting from spaulding, flaking or delaminating of the deposits in semiconductor processing. Claim 19 discloses heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode. Claim 69 discloses heating the upper electrode to cause halogen elements to de-absorb from the upper electrode. Claim 84 discloses heating the upper electrode to cause decomposing one or both of platinum chloride and platinum dioxide.

Applicant submits that the present claim is patentable over Imai in view of Keizo since both Imai and Keizo all fail to disclose at least an element of the present claim, namely heating

the upper electrode to a temperature to form a more stable layer from the platinum deposits on the upper electrode.

Imai discloses a plasma reactor having a heater to heat an electrode to a constant temperature. However, Imai is silent with respect to heating the upper electrode to a temperature to form a more stable layer. The Examiner also agreed that Imai fails to expressly disclose heating the upper electrode to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the surface (Office Action, p. 9).

Keizo discloses a method to form a vertical side wall during a platinum etch process by heating the wafer to at least 350C (Abstract, lines 1-6). Keizo discloses that at high temperature, there is no contamination reattached on the side wall in a treatment step.

Keizo is silent with respect to a heated upper electrode, and thus applicant submits that Keizo fails to disclose heating the upper electrode to a temperature to form a more stable layer.

Further, applicant submits that the present claim is not obvious to persons skilled in the art in view of a combination of Imai and Keizo, since there is no motivation or suggestion to use the heater of Imai in the platinum etch process of Keizo to heat the upper electrode to form a stable film. The lack of motivation to heat the upper electrode can be attributed to at least the following reasons:

1. There is no indication from either Imai or Keizo that there are deposits of platinum and one or both of the oxygen and chlorine on the upper electrode. Imai is silent with respect to a platinum etch, and thus fails to indicate deposits of platinum or oxygen or chlorine on the upper electrode. Applicant also submits that Imai is silent with respect to any material depositing on the upper electrode. Imai discloses that the rough upper electrode release more free silicon to react with fluorine. Thus applicant further submits that Imai teaches away from the present invention depositing on the upper electrode.

Keizo discloses an etch process of a platinum wafer using chlorine gas. Keizo further discloses that contamination can reattached to the side wall features on the wafer. Thus applicant submits that Keizo discloses that deposits can form on the platinum wafer during the etch process. Applicant submits that Keizo is silent with respect to deposits forming on the upper electrode.

2. There is no indication from either Imai or Keizo that heating the upper electrode would form a more stable film on the surface of the electrode. Imai is silent with respect to a platinum etch, to platinum etch by-products, and also fails to indicate heating the upper electrode would form a more stable film. Imai is silent with the purpose of heating the upper electrode, and stated simply that a heater is to heat the upper electrode to a constant temperature. Thus applicant submits that Imai fails to teach heating to form a more stable film on the upper electrode.

Keizo discloses a method to etch a vertical feature of platinum on a wafer. Keizo discloses a relationship between the wafer temperature and the contamination reattached on the wafer surface. Keizo is mainly concern with the vertical side wall of the feature, as shown in the difference between Fig. 2(b) and 2(c).

However, Keizo provides no suggestion or motivation of heating to a temperature to form more stable film as disclosed by the present claim, which directs to the stability of the platinum deposits on the upper electrode. The vertical side wall is not a main concern, since there are no features on the upper electrode. Thus applicant submits that it is not obvious to person skilled in the art to infer from Keizo's disclosure that high temperature deposits are more stable. Platinum chloride compounds are solid at up to 400C (for example, $PtCl_2$ melts at 581C, and $PtCl_4$, 370C), and thus applicant submits that there is no suggestion of increasing film stability by Keizo.

In the Office Action, the Examiner stated that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Imai et al. so as to perform the platinum etch process of Keizo et al. because this would be a suitable method,

for example, to reduce the platinum deposits that can form on the wafer" (underlined added by applicant).

Applicant submits that the present claim directs to the stability of the platinum deposits on the upper electrode, which can cause flaking or delamination and degrade etching performance. The deposits or the deposits' thickness on the wafer are not a concern, thus applicant submits that even that it is obvious to combine Imai with Keizo to reduce the platinum deposits that can form on the wafer, it still would not be obvious to form a more stable film on the upper electrode.

In the Office Action, the Examiner further stated that "note that the process of Imai et al. modified by Keizo et al. includes a process where platinum and one or both of oxygen and chlorine are deposited on the upper electrode, and the layer of material formed on the upper electrode is more stable than a layer of material form when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode" (underlined added by applicant).

Applicant submits that this statement is strictly highsight, generated as a result of the present invention. Imai and Keizo are all silent with respect to heating the upper electrode to form a more stable film. Further, as discussed above, there is no motivation or suggestions from both Imai and Keizo to form a stable film on the upper electrode surface by heating the electrode.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

Claims 67, 70, and 85 stand or fall together, and claim 67 is a representative claim. Claim 67 recites:

67. The method of claim 19, wherein the step of heating using the heater that heats the upper electrode comprises heating to a temperature between about 300°C to about 500°C.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer, which reduces the disadvantages resulting from spaulding, flaking or delaminating in semiconductor processing. The present claim provides a limitation of the temperature between about 300C to about 500C. Applicant submits that in certain embodiments, this temperature provides the transition to a more stable film of the deposits on the electrode surface.

Applicant submits that the present claim is patentable over Imai in view of Keizo since both Imai and Keizo all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature between about 300C to about 500C to form a more stable layer.

Imai discloses a heater to heat an electrode to a constant temperature, and Keizo discloses heating a wafer above 350C. Thus both references fail to disclose heating the upper electrode to between about 300C to about 500C.

Further, applicant submits that it is not obvious to one of ordinary skill in the art to modify the temperature range of Imai or Keizo, mainly due to lack of motivation. Imai is silent with respect to the purpose of heating the upper electrode. Keizo discloses heating the wafer to control the etch profile above 350C.

Further, the present claim directs to stabilize the deposits on the upper electrode, and for that, a temperature range between 300 and 500C is desirable in certain embodiments. Applicant submits that both Imai and Keizo fail to suggest any motivation to heat the upper electrode to this temperature range.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

F. Claims 68, 71 and 85 are unpatentable under 35 U.S.C. § 103(a) over Imai in view of Keizo as applied to claims 19, 67, 69-70, 72-75, and 84 above, and further in view of Collins.

Claim 85 stands alone. Claim 85 recites:

85. The method of claim 84, wherein the upper electrode comprises aluminum and the upper electrode is heated to a temperature ranging from 300°C to 350°C.

At least certain embodiments of the present invention direct to heating the upper electrode to a temperature to form a more stable layer, which reduces the disadvantages resulting from spaulding, flaking or delaminating in semiconductor processing. The present claim provides a limitation of the temperature between about 300C to about 350C. Applicant submits that in certain embodiments, this temperature provides the transition to a more stable film of the deposits on the electrode surface.

Applicant submits that the present claim is patentable over Imai, Keizo and Collins since these prior art references all fail to disclose at least an element of the present claim, namely heating the upper electrode to a temperature between about 300C to about 350C to form a more stable layer.

Collins discloses a heater capable of heating an electrode to 120C, Keizo discloses heating a wafer above 350C, and Imai discloses heating an upper electrode to a constant temperature. Thus all references fail to disclose heating the upper electrode to between about 300C to about 350C.

Further, applicant submits that it is not obvious to one of ordinary skill in the art to modify the temperature range of Imai, Collins or Keizo, mainly due to lack of motivation. Imai is silent with respect to the purpose of heating the electrode. Collins discloses heating an electrode for increase reactivity, and thus there is no advantage to heat the electrode to above 120C. Keizo discloses heating the wafer to control the etch profile above 350C.

Further, the present claim directs to stabilize the deposits on the upper electrode, and for that, a temperature range between 300 and 350C is desirable in certain embodiments. Applicant submits that the prior art references all fail to suggest any motivation to heat the upper electrode to this temperature range.

Hence, applicant submits that this combination of references does not constitute a proper prima facie obviousness rejection. The rejection is improper and should be reversed.

VIII. CONCLUSION

For all the above reasons, Appellants respectfully submit that

claims 19, 67-75, and 84-85 are patentable under 35 U.S.C. § 103(a) over Collins et al. ("Collins", U.S. Patent 5,556,501) in view of DeOrnellas et al. ("DeOrnellas", WO 99/25568);

claims 19, 67-75, and 84-85 are patentable under 35 U.S.C. § 103(a) over Collins in view of Keizo (JP 07-130712A);

claims 19, 67, 69-70, 72-75, and 84 are patentable under 35 U.S.C. § 103(a) over Imai et al. ("Imai", WO 97/27622) in view of DeOrnellas.

claims 68, 71 and 85 are patentable under 35 U.S.C. § 103(a) over Imai in view of DeOrnellas as applied to claims 19, 67, 69-70, 72-75, and 84 above, and further in view of Collins;

claims 19, 67, 69-70, 72-75, and 84 are patentable under 35 U.S.C. § 103(a) over Imai in view of Keizo;

claims 68, 71 and 85 are patentable under 35 U.S.C. § 103(a) over Imai in view of Keizo as applied to claims 19, 67, 69-70, 72-75, and 84 above, and further in view of Collins.

Appellants respectfully request that the Board reverse the rejections on all pending claims and direct the Examiner to enter a Notice of Allowance for these claims.

Respectfully submitted,

Date: May 27, 2008

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IX. CLAIMS APPENDIX

1-18. (Canceled).

19. (Previously Presented) A method of operating a reactor which comprises a reactor chamber, an upper electrode, a heater that heats said upper electrode, and gas inlets and outlets, the method comprising:

introducing process gas into said reactor chamber, wherein the method of operation of the reactor is a platinum etch method, and wherein oxygen and chlorine are present in the reactor;

wherein platinum and one or both of the oxygen and the chlorine are deposited on the upper electrode;

heating the upper electrode with said heater to a temperature in order to cause deposits of oxygen and chlorine to de-absorb from the upper electrode in order to leave mostly platinum deposited on the electrode, such that a layer of material is formed on the upper electrode;

wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of oxygen and chlorine to de-absorb from the upper electrode.

20-66. (Canceled)

67. (Previously Presented) The method of claim 19, wherein the step of heating using the heater that heats the upper electrode comprises heating to a temperature between about 300°C to about 500°C.

68. (Previously Presented) The method of claim 19, wherein the reactor further comprises at least one side electrode, and a second heater provided in the at least one side electrode that heats said at least one side electrode, and gas inlets and outlets, the method further comprising:

heating the at least one side electrode with said second heater such that any material resulting from the reaction deposited on the surface of the at least one side electrode forms a stable layer of material.

69. (Previously presented) A method of platinum etch in a reactor which comprises a reactor chamber, an upper electrode, a heater that heats said upper electrode, and gas inlets and outlets, the method comprising:

introducing process gas into said reactor chamber; and

heating the upper electrode with said heater to a temperature in order to cause halogen elements to de-absorb from the upper electrode such that deposits of mostly platinum forms a layer of material;

wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to cause deposits of mostly platinum on the surface of the upper electrode.

70. (Previously Presented) The method of claim 69, wherein the step of heating using the heater that heats the upper electrode comprises heating to a temperature between about 300°C to about 500°C.

71. (Previously Presented) The method of claim 69, wherein the reactor further comprises at least one side electrode, and a second heater provided in the at least one side electrode

that heats said at least one side electrode, and gas inlets and outlets, the method further comprising:

heating the at least one side electrode with said second heater such that any material resulting from the reaction deposited on the surface of the at least one side electrode forms a stable layer of material.

72. (Previously Presented) The method of claim 69, wherein the step of heating includes heating the surface of the upper electrode with the heater until any volatile compound of platinum collected on the surface of the upper electrode de-absorbs from the surface of the upper electrode.

73. (Previously Presented) The method of claim 72, wherein the volatile compound of platinum is a compound of platinum with chlorine or oxygen.

74. (Previously Presented) The method of claim 69, wherein the step of heating includes heating the surface of the upper electrode until any volatile compound of platinum collected on the surface of the upper electrode boils off the surface of the upper electrode.

75. (Previously Presented) The method of claim 74, wherein the volatile compound of platinum is a compound of platinum with chlorine or oxygen.

76.-83. (Canceled)

84. (Previously presented) A method of operating a reactor which comprises a reactor chamber, an upper electrode, a heater that heats said upper electrode, and gas inlets and outlets, the method comprising:

introducing process gas into said reactor chamber, the process gas including one or both of oxygen and chlorine;

performing a platinum etch process in said reactor chamber; and

heating the upper electrode with said heater to a temperature capable of decomposing one or both of platinum chloride and platinum dioxide so that a layer of material formed on the upper electrode during the platinum etch process comprises mostly platinum; and

wherein the layer of material formed on the upper electrode is more stable than a layer of material formed when heating the upper electrode with said heater to a temperature insufficient to decompose the one or both of platinum chloride and platinum dioxide.

85. (Previously presented) The method of claim 84, wherein the upper electrode comprises aluminum and the upper electrode is heated to a temperature ranging from 300°C to 350°C.

86. (Canceled)

X. EVIDENCE APPENDIX

No other evidence is submitted in connection with this appeal.

XI. RELATED PROCEEDINGS APPENDIX

No related proceedings exist.